

1. Which of the following equations represents the line that passes through point (3, 2) and has a slope of $\frac{1}{3}$?

☒ A $y = \frac{1}{3}x + 1$

☐ B $y = \frac{1}{3}x + 2$

☐ C $y = \frac{1}{3}x + \frac{7}{3}$

☐ D $y = \frac{1}{3}x + 3$

$$y - y_1 = m(x - x_1)$$

$$x_1 = 3 \quad y_1 = 2$$

$$m = \frac{1}{3}$$

$$y - 2 = \frac{1}{3}(x - 3)$$

$$y - 2 = \frac{1}{3}x - \frac{1}{3} \cdot 3$$

$$y - 2 = \frac{1}{3}x - 1$$

$$y = \frac{1}{3}x + 1$$

OR PLUG IN
 $x = 3 \quad y = 2$ IN
THE ANSWERS
 $2 = \frac{1}{3} \cdot 3 + 1$
 $2 = 1 + 1 = 2$

2. Kiesha wants to enlarge a photograph that has a length of 10 inches and a width of 8 inches. If Keisha wants her new, larger photograph to have a width of 12 inches, how long must the new photograph be in order to be proportional to the original photograph?

☐ A 12 inches

☒ B 15 inches

☐ C 18 inches

☐ D 22 inches

$$l_1 = 10$$

$$w_1 = 8 \quad w_2 = 12$$

$$\frac{l_1}{w_1} = \frac{l_2}{w_2}$$

$$\frac{10}{8} = \frac{x}{12}$$

$$10 \cdot 12 = 8x$$

$$120 = 8x$$

$$x = 15$$

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3. What is the y-intercept of the linear equation $3x - 4y = 7$?

☒ A $(0, -\frac{7}{4})$

☐ B $(0, \frac{7}{4})$

☐ C $(0, \frac{7}{3})$

☐ D $(0, -\frac{7}{3})$

PLUG IN THE ANSWERS IN THE EQUATION
(LEFT IS EQUAL TO RIGHT)
 $x=0$

$$-4y = 7$$

$$y = -\frac{7}{4}$$

$$(0, -\frac{7}{4})$$

4. The area of a circle is approximately 113 square centimeters.

What is the approximate length of the radius of the circle?

☐ A 12 centimeters

☒ B 6 centimeters

☐ C 18 centimeters

☐ D 38 centimeters

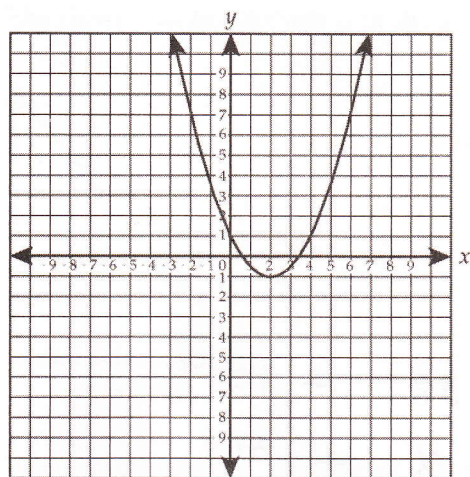
$$A = \pi R^2$$

$$R^2 = \frac{A}{\pi}$$

$$R = \sqrt{\frac{A}{\pi}} = \sqrt{\frac{113}{3.14}} \approx 6 \text{ cm}$$

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5.



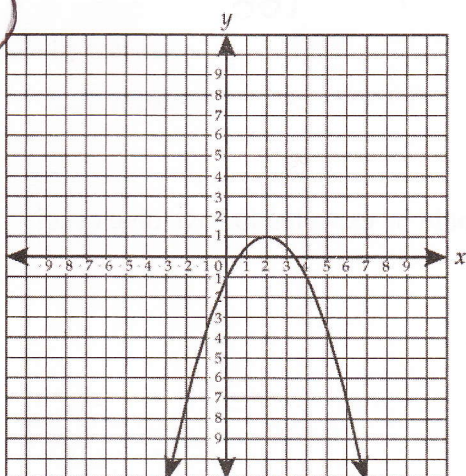
NOTE THE LOCATION OF
THE VERTEX: $x = 2$; $y = -1$

A HAS THE SAME COORDINATES
OF THE VERTEX $x = 2$; $y = -1$

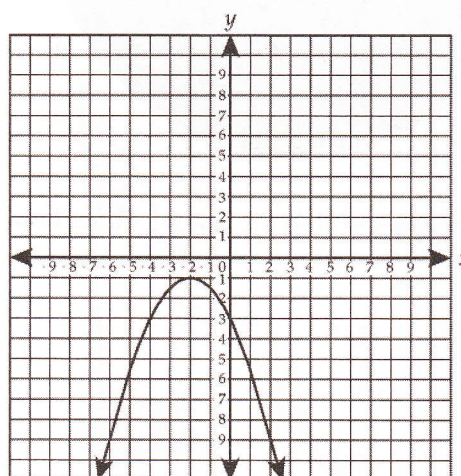
OR $y = x^2$ and $y = -x^2$ AND
SEE HOW THEY DIFFER

The figure above shows the graph of $y = f(x)$. Which of the following is the graph of $y = -f(x)$?

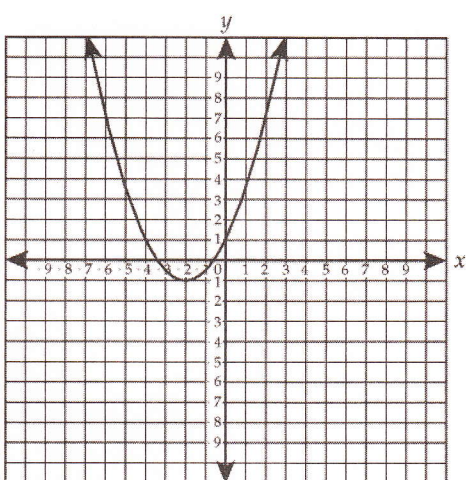
A



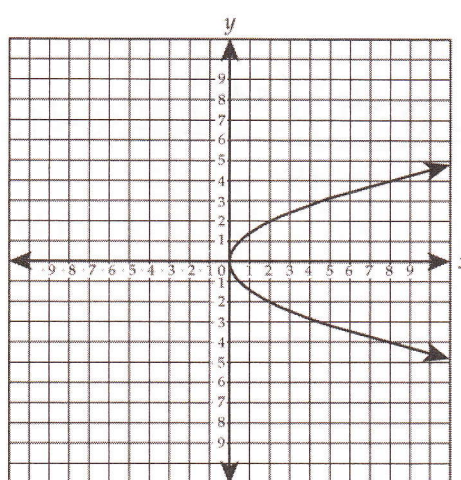
C



B

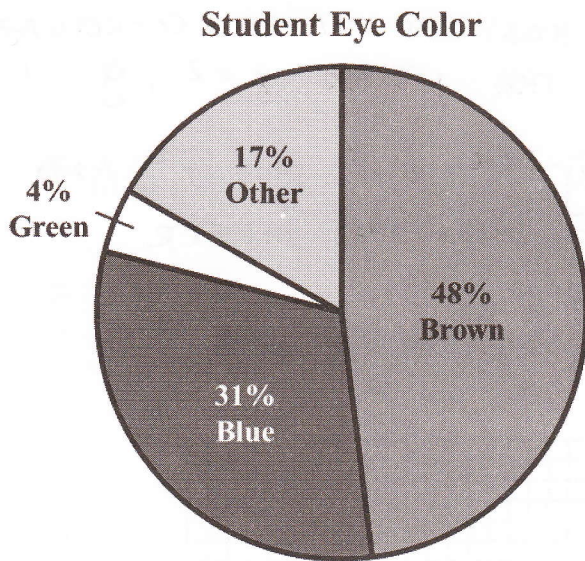


D



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6. This graph represents the eye color of students in a local school.



$$\begin{array}{rcl}
 238 & - & 100\% \\
 \times & - & 31\% \\
 \hline
 x & = & \frac{31 \cdot 238}{100} \approx 74\%
 \end{array}$$

If 238 new students enroll in the school, about how many could be expected to have blue eyes?

- A 114
- B 164
- C 40
- ☒ D 74

7. Simplify the expression.

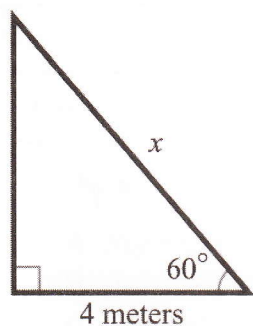
$$\frac{x^2 - 16}{x + 4} = \frac{(x-4)(x+4)}{x+4} = x-4$$

Note: $x \neq -4$

- A $x + 12$
- B $x - 12$
- C $x + 4$
- ☒ D $x - 4$

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8. The flowerbed in a garden is in the shape of a right triangle.

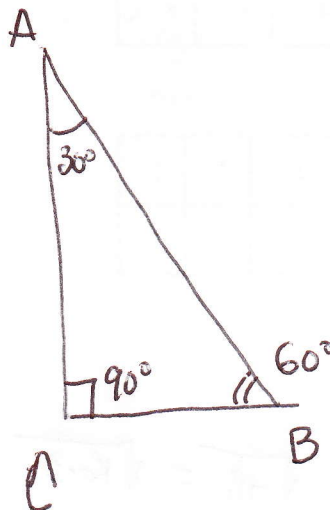


4 meters' side is
HALF OF THE X LENGTH
 $4 \cdot 2 = 8$

What is the length of the longest side of the flowerbed?

- A $4\sqrt{3}$ meters
- ☒ B 8 meters
- C 16 meters
- D $4\sqrt{2}$ meters

IN ANY $30^\circ - 60^\circ - 90^\circ$ TRIANGLE



$$AB = 2 BC$$

$$\text{or } BC = \frac{AB}{2}$$

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9. Which of the following is **not** a function?

A

x	1	2	3	4
y	5	0	3	7

B

x	0	3	4	7
y	1	1	1	1

C

x	0	1	1	3
y	2	4	6	8

D

x	-4	-2	2	4
y	-4	-2	3	7

X HAS TO BE DIFFERENT

10. Simplify.

$$\sqrt{48}$$

A $6\sqrt{8}$

B $3\sqrt{16}$

C $4\sqrt{3}$

D $16\sqrt{3}$

$$\sqrt{48} = \sqrt{16 \cdot 3} = \sqrt{16} \cdot \sqrt{3} = 4\sqrt{3}$$

↓
4

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11. What is the function rule $f(n)$ for the sequence below?

0	n	1	2	3	4	5	6	7
-10	$f(n)$	-3	4	11	18	25	32	39

$b =$ $m = 7 \quad 7 \quad 7 \quad 7 \quad 7$

- A $f(n) = -3n$
 B $f(n) = n^2 - 4$
 C $f(n) = n^2 + 2$
 D $f(n) = 7n - 10$

$y = mx + b$

$y = mx + b$
 $f(n) = 7n - 10$

constant difference is a slope

when $n = 0$ $f(n) = -10$
 $(x = 0) \quad (f(x) = y) = -10$
 is your intercept

12. A rectangular prism has a volume of m cubic centimeters. The length, width, and height of the prism are multiplied by 3.

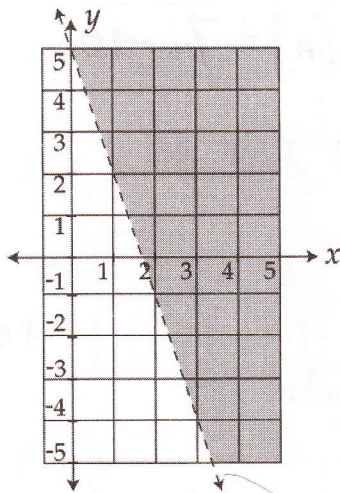
What is the volume of the resulting prism?

- A $27m$ cubic centimeters
 B $9m$ cubic centimeters
 C $3m$ cubic centimeters
 D $6m$ cubic centimeters

$3m \cdot 3m \cdot 3m = 27m^3$

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13. Which inequality matches this graph?



- A $y \leq -3x + 5$
- B $y \geq -3x + 5$
- C $y < -3x + 5$
- ☒ D $y > -3x + 5$

LESS GREATER
DOTTED LINE : use \downarrow or \uparrow
THE SHADED REGION IS ABOVE
THE LINE \rightarrow GREATER USE $>$

DOTTED LINE
SHADED REGION IS ABOVE THE LINE (GREATER)

14. Simplify.

$$(3x^2)(2x^4) = 3 \cdot 2 \cdot x^2 \cdot x^4 = 6x^6$$

- A $6x$
- B $48x$
- ☒ C $6x^6$
- D $6x^8$

$$\text{or } x \cdot x \cdot x \cdot x \cdot x = x^6$$

$$x^2 \cdot x^4 = x^{2+4} = x^6$$

15. Find the zeros of the quadratic function.

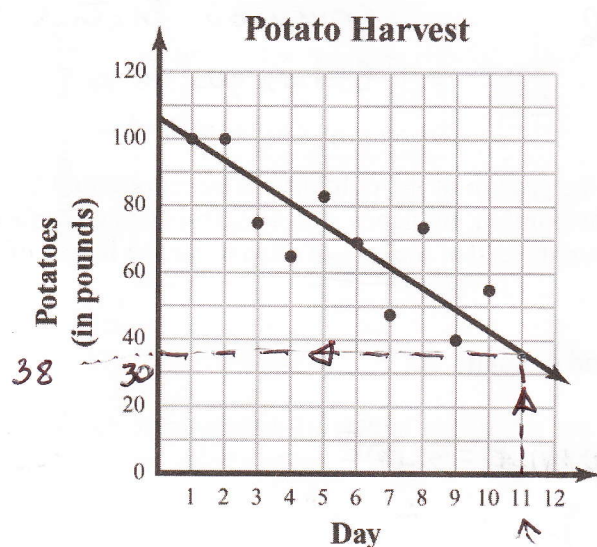
$$x^2 - 4x - 21 = 0$$

- A The zeros are -7 and -3.
- B The zeros are 7 and 3.
- ☒ C The zeros are 7 and -3.
- D The zeros are -7 and 3.

OR ON A GRAPHING CALCULATOR FIND WHERE $x^2 - 4x - 21 = 0$
INTERSECTS AXIS
 $-7 + 3 = -4$ $(-4x)$
 $-7 \cdot 3 = -21$ (-21)
 x

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16. The scatter plot shows the number of pounds of potatoes collected during each day of a harvest.



How many pounds of potatoes could a farm expect to collect during the eleventh day of the harvest?

- A 15
B 84
C 23
D 38

17. If $f(x) = 5x^2 - 2x + 3$ and $g(x) = -x^2 + 6x - 1$, find $f + g$.

- A $-6x^2 - 4x + 2$
B $4x^2 - 4x + 4$
C $6x^2 + 8x + 4$
D $4x^2 + 4x + 2$

$$f(x) + g(x)$$

$$\begin{array}{r} 5x^2 - 2x + 3 \\ -x^2 + 6x - 1 \\ \hline \hline \hline \end{array} = 4x^2 + 4x + 2$$

↑
combine like terms

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18. What is the greatest common factor of $48a^3b^5$ and $92a^5bc^2$?

- ☒ A $4a^3b$
☐ B $2ab$
☐ C $4a^2b^2$
☐ D $16a^3b$

48 and 92 can be divided by 4
 (not by sixteen)
 $48 \underline{aaa} \underline{bbbbb}$
 $92 \underline{aaaaa} \underline{b} \quad cc$
 common factors for letters a^3b

19. Benjamin is researching dolphin growth. He finds that the growth of the dolphin can be represented by the equation $y = 9x + 38$ where y represents the length of the dolphin, in inches, and x represents the number of months he has been observing the dolphin. Benjamin notices that the rate of change for the length of a second dolphin is greater than that of the first.

Which equation could represent the growth of the second dolphin?

- ☐ A $y = 8x + 46$
☒ B $y = 12x + 24$
☐ C $y = -9x + 43$
☐ D $y = x + 38$

RATE OF CHANGE = SLOPE

$y = mx + b$
SLOPE = RATE OF CHANGE

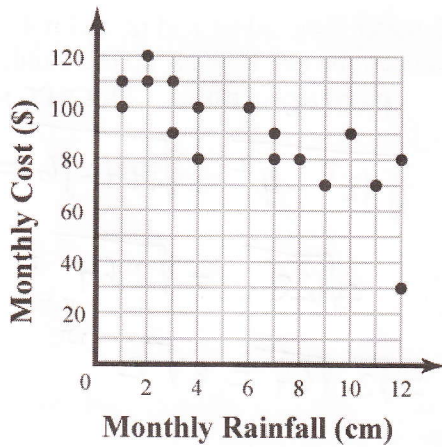
20. If a circle has the circumference of 16π units, what is the measure of the circle's radius?

- ☐ A 2 units
☐ B 16 units
☐ C 4 units
☒ D 8 units

$$C = 2\pi r \quad R = \frac{C}{2\pi} = \frac{16\pi}{2\pi} = 8$$

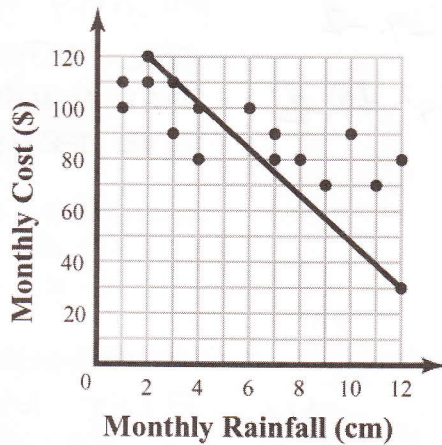
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21. This scatter plot shows the relationship between the average monthly rainfall in a city and the monthly cost for the city to maintain the sports fields in a park.

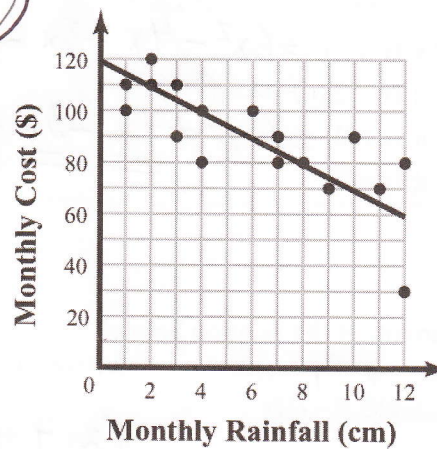


Which graph shows the line of best fit for the scatter plot?

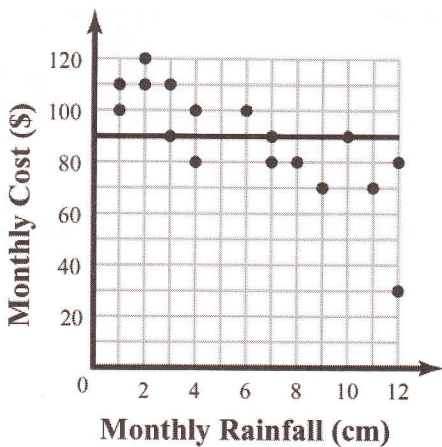
A



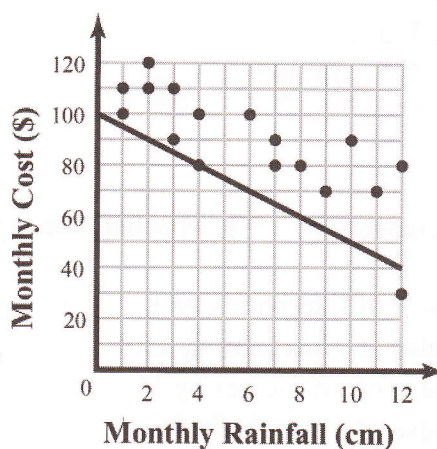
C



B



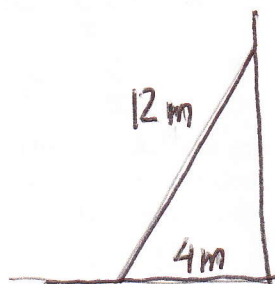
D



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22. The fire department rescued a cat from a building. They used a 12-meter long ladder and placed it 4 meters away from the base of the building. If the ladder exactly reached the cat, how far up the building was the cat?

- A 8 meters
☒ B $8\sqrt{2}$ meters
 C $4\sqrt{10}$ meters
 D 16 meters



PYTHAGOREAN THEOREM

$$\begin{aligned} \sqrt{12^2 - 4^2} &= \sqrt{144 - 16} = \\ &= \sqrt{128} = \sqrt{2 \cdot 64} = \\ &= \sqrt{2} \cdot \sqrt{64} = 8\sqrt{2} \end{aligned}$$

23. Factor.

$$6x^2 + x - 2$$

- ↑ A $(2x+1)(3x-2) = 6x^2 - 4x + 3x - 2 = 6x^2 - x - 2$
 B $(2x+1)(3x+2)$ ALL PLUSSES
☒ C $(2x-1)(3x+2) = \underline{6x^2} + \underline{4x} - \underline{3x} - \underline{2} = 6x^2 + x - 2$
 D $(2x-1)(3x-2)$

MULTIPLY USING
FOIL METHOD AND
THEN COMBINE
LIKE TERMS

24. What is the domain of the relation below?

$$\left\{ \begin{matrix} x & y \\ (3, 12), & (7, 32), & (12, 147) \end{matrix} \right\}$$

- ☒ A {3, 7, 12}
 B {12, 32, 147}
 C {3, 12, 7, 32}
 D {3, 12, 7, 32, 12, 147}

$$\{3, 7, 12\}$$

ALL FIRST NUMBERS
IN PAIRS ARE X -
DOMAIN

25. In the linear relationship $5x = y$, what happens to y if x is decreased by 3?

- A The value of y decreases by 3.
 B The value of y increases by 15.
☒ C The value of y decreases by 15.
 D The value of y is multiplied by 5.

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26. What is $\sqrt{8}$ rounded to the nearest tenth?

☒ A 2.8
☐ B 2.4
☐ C 3.6
☐ D 8.0

$$\sqrt{8} = 2.828 = \underline{\underline{2.8}}$$

↑
ON A GRAPHING CALCULATOR

27. A taxi service to the airport charges a \$5.90 airport fee, plus \$2.60 per mile. Which equation can be used to determine how many miles, m , you traveled if your total fee was \$50.10?

☐ A $m + 2.6 + 5.9 = 50.1$
☒ B $2.6m + 5.9 = 50.1$
☐ C $5.9m - 2.6 = 50.1$
☐ D $2.6m - 5.9 = 50.1$

$$y = mx + b$$

$$m = 2.6$$

$$b = 5.9$$

$$y = 50.1 - \text{TOTAL FEE}$$

$$y = mx + b$$

$$50.1 = 2.6m + 5.9$$

28. Look at this equation.

$$m_1 = 5$$

$$y = 5x - 10$$

Which equation represents a line parallel to the given equation?

☐ A $y + 5x = 7$

HERE

$$y = -5x + 7, m_2 = -5$$

$$m_1 = m_2$$

m_2 should be 5

☐ B $y = -\frac{1}{5}(x - 4)$

$$m_2 = -\frac{1}{5}$$

☒ C $y - 5x + 2 = 0$

$$y = 5x - 2$$

$$m_2 = 5$$

☐ D $y = \frac{1}{5}x + 1$

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29. Find the solution to the system of equations.

$$\begin{array}{r} 2 \quad \begin{cases} 7x + 3y = 26 \\ 5x - 2y = 31 \end{cases} \\ 3 \quad \begin{cases} 14x + 6y = 52 \\ 15x - 6y = 93 \end{cases} \\ \hline 29x = 145 \\ x = 5 \\ y = -3 \end{array}$$

- A (2, 4)
 B (5, -3)
 C (41, 87)
 D (5, -28)

OR PLUG IN X AND Y IN THE EQUATION,

$$\begin{array}{l} 5x - 2y = 31 \\ 5(5) - 2y = 31 \\ 25 - 31 = -2y \\ -6 = -2y : y = 3 \end{array}$$

30.

Simplify the expression $\left(\frac{8a^2b^3}{2a^3}\right)^{-1}$. Assume that no variable is equal to zero.

A $4ab^3$

B $\frac{4ab^3}{a}$

C $\frac{1}{4ab^3}$

D $\frac{a}{4b^3}$

$$\frac{2a^3}{8a^2b^3} = \frac{1a}{4b^3} = \frac{a}{4b^3}$$

$$\left(\frac{8a^2b^3}{2a^3}\right)^{-1} \quad \{ \text{flip} \} \quad \frac{2a^3}{8a^2b^3}$$

$$\frac{2 \quad \cancel{a} \cancel{a} \cancel{a}}{8 \quad \cancel{a} \cancel{a} \quad b b b} = \frac{1 \cdot a}{4 \cdot b^3}$$